CLAIMS

We claim:

1. A method of pre-computing routes for nets in a region of a circuit layout, the method comprising:

a) defining a set of partitioning lines for partitioning the region into a plurality of sub-regions during a routing operation;

b) identifying a primary set of sub-regions that has more than one sub-region;

c) determining whether the primary set of sub-regions is an open set that has a sub-region that is not adjacent to any other sub-region in the set;

d) if the primary set of sub-regions is not an open set,

identifying a route that connects the sub-regions in the primary set;

storing the identified route for the primary set of sub-regions.

2. The method of claim 1 further comprising:

identifying multiple routes that traverse the sub-regions in the primary set when the primary set of sub-regions is not an open set.

3. The method of claim 2, wherein the routes are minimum trees, where each tree traverses the sub-regions in the primary set.

4. The method of claim 1 further comprising:

if the primary set of sub-regions is an open set,

identifying a connection set of sub-regions that when combined with the primary set forms a closed set of sub-regions that (i) does not have any sub-region that is not adjacent to another sub-region in the closed set, and (ii) can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions;

storing at least either the connection set of sub-regions or the closed set of sub-regions for the primary set of sub-regions.

5. The method of claim 4 further comprising:

when the primary set of sub-regions is an open set, identifying and storing multiple connection set of sub-regions for the primary set of sub-regions, wherein each connection set when combined with the primary set forms a closed set of sub-regions that (i) does not have any sub-region that is not adjacent to another sub-region in the closed set, and (ii) can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions.

6. The method of claim 1 further comprising:

a) identifying several primary sets of sub-regions, wherein each primary set of sub-regions has more than one sub-region;

b) for each primary set,

determining whether the primary set is an open set that has a sub-region that is not adjacent to any other sub-region in the set;

if the primary set of sub-regions is not an open set, (i) identifying a route that connects the sub-regions in the primary set, and (ii) storing the identified route for the primary set of sub-regions.

7. The method of claim 6 further comprising:

for each of a plurality of the primary sets, identifying multiple routes that traverse the sub-regions in the primary set when the primary set of sub-regions is not an open set.

8. The method of claim 7, wherein the routes are minimum trees.

9. The method of claim 6 further comprising:

if a primary set of sub-regions is an open set,

identifying a connection set of sub-regions that when combined with the primary set forms a closed set of sub-regions that (i) does not have any sub-

region that is not adjacent to another sub-region in the closed set, and (ii) can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions;

storing at least either the connection set of sub-regions or the closed set of sub-regions for the primary set of sub-regions.

10. The method of claim 9 further comprising:

when a first primary set of sub-regions is an open set, identifying and storing multiple connection set of sub-regions for the first primary set of sub-regions, wherein each connection set when combined with the first primary set forms a closed set of sub-regions that (i) does not have any sub-region that is not adjacent to another sub-region in the closed set, and (ii) can be traversed by a minimum tree route that connects each sub-region in the connection set to at least two other sub-regions in the primary and connection sets of sub-regions.

11. The method of claim 6, wherein a plurality of paths exist between the sub-regions defined by the set of partitioning lines, wherein the routes are defined with respect to the paths.

12. The method of claim 11, wherein a plurality of the paths are diagonal paths, wherein some of the routes traverse some of the diagonal paths.

13. The method of claim 6, wherein a plurality of edges exist between the sub-regions defined by the set of partitioning lines, wherein the routes are defined with respect to the paths.

14. The method of claim 13, wherein a plurality of the edges between the sub-regions are diagonal edges, wherein some of the routes intersect some of the diagonal edges.